TISA Status

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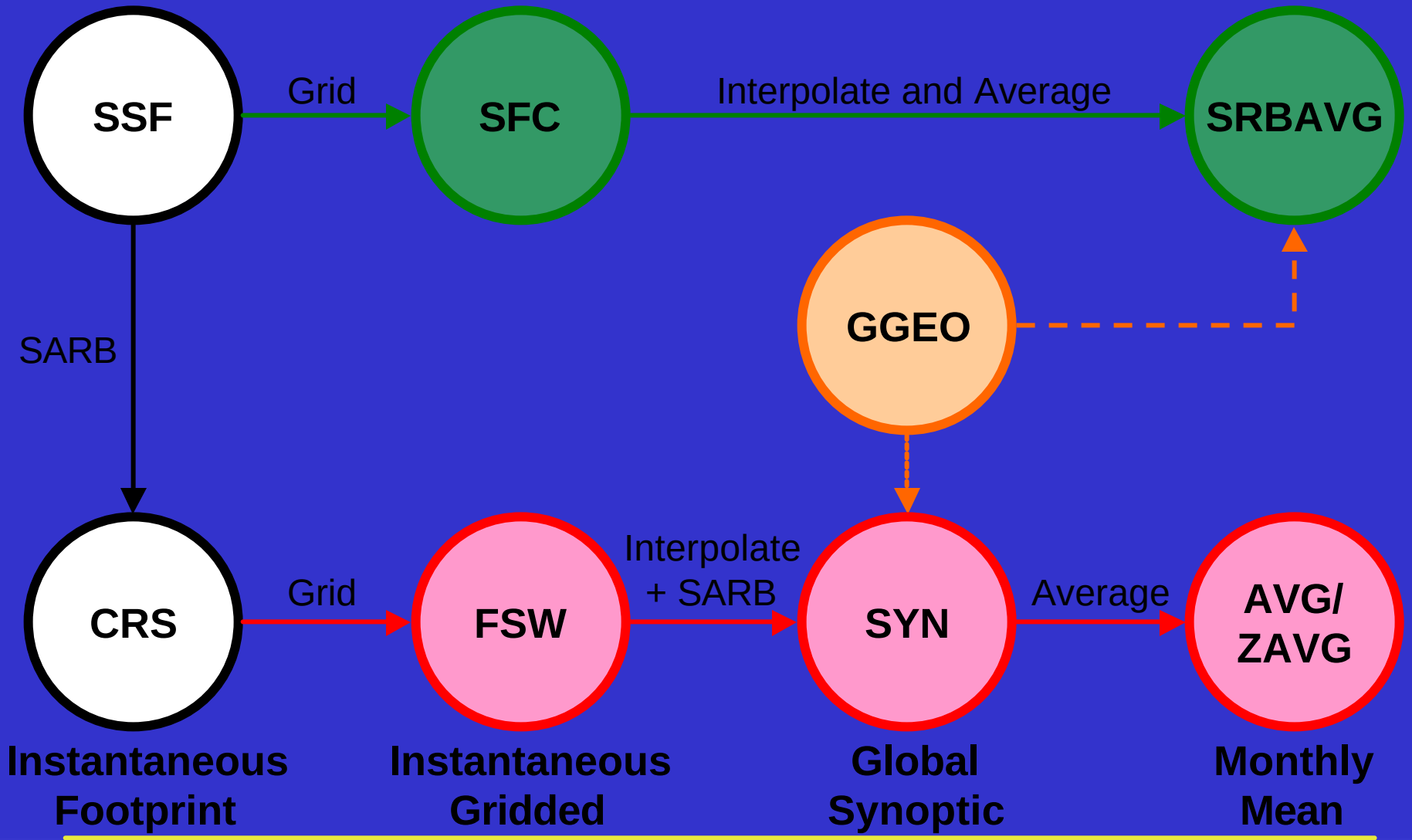
Outline

- Data products update
- Improvements to GGEO for Terra
- First look at a year of global SRBAVG data

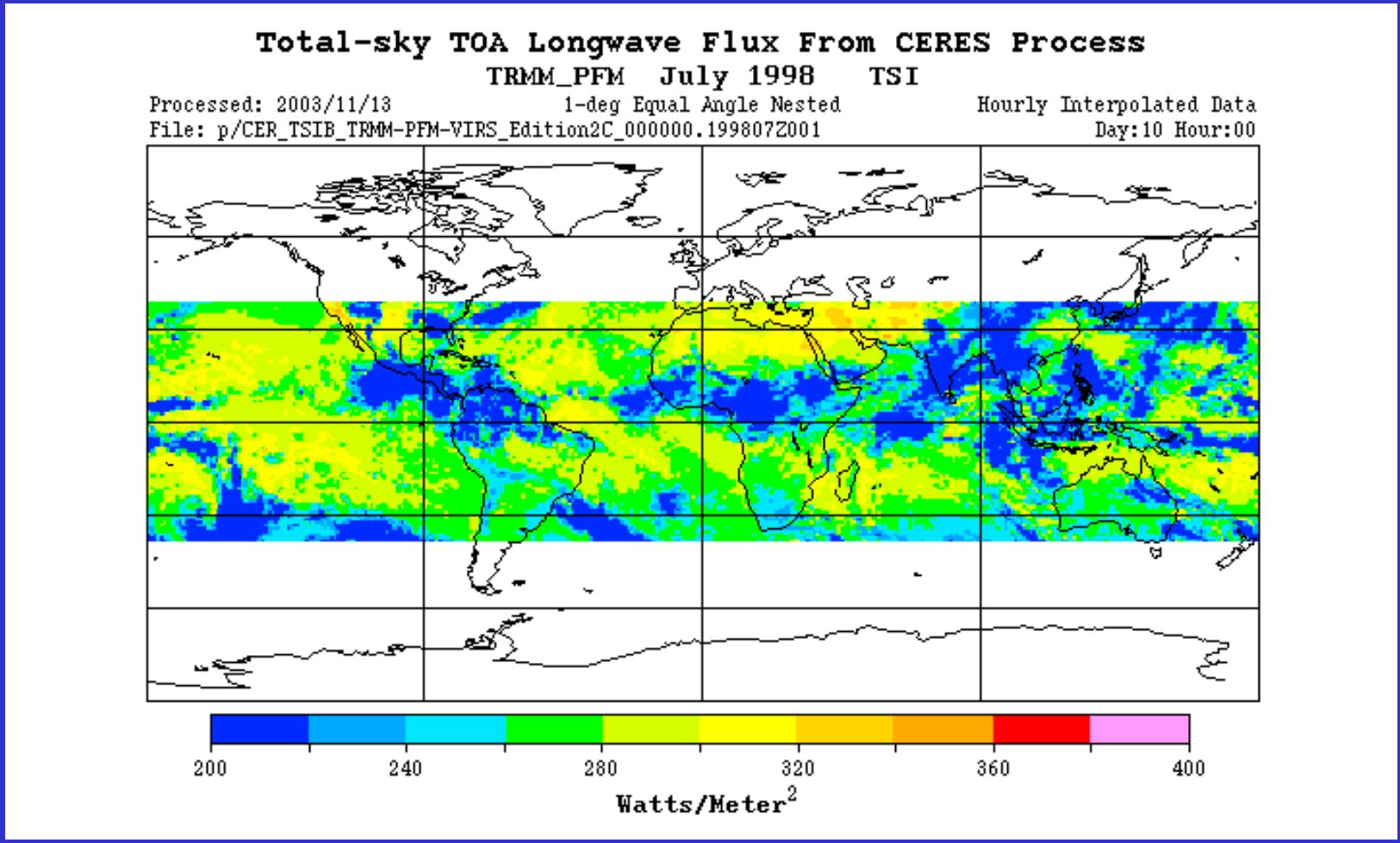
CERES Advanced TISA Processing



TISA Software Development Status
FSW / SYN / AVG / ZAVG

- Software updated to include overlap hours
- Cloudy sky/No Aerosol Flux profile data added
- TRMM ADM types used to sort Terra FSW SW flux
- The HDF compression was added to AVG/SYN to reduce the output file size. A savings of approximately 70%
- 3-hourly integration algorithms implemented

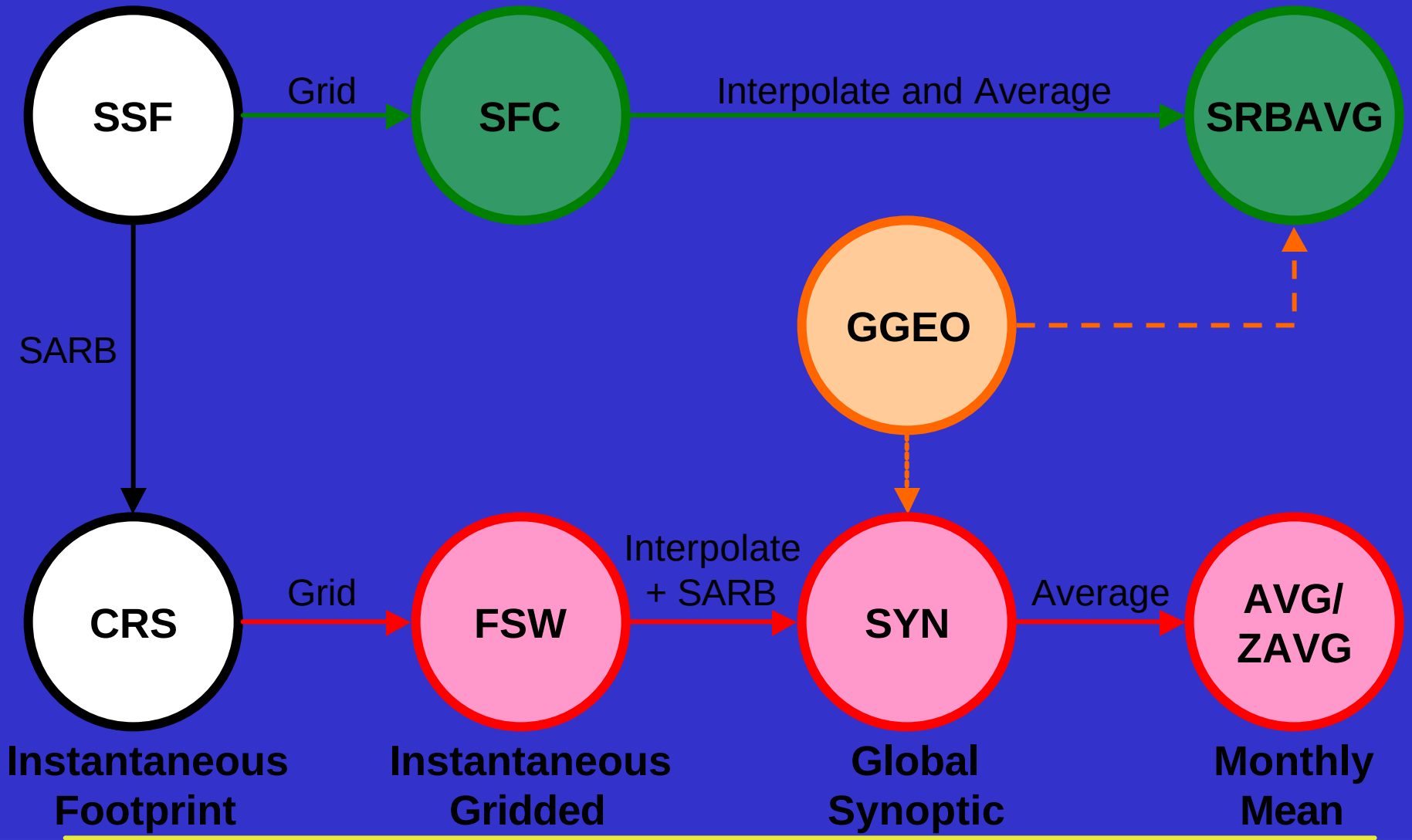
SYN Movie 10 Days of Hourly Synoptic Data



What's Next?
FSW / SYN / AVG / ZAVG

- Product on hold - emphasis on SRBAVG
- Run on Terra data
- Run latest version through SARB
- Produce AVG and compare with SRBAVG monthly means

CERES Advanced TISA Processing



TISA Software Development Status
GGEO

- Calibration time series finalized
  - VIS from deep convective clouds
  - IR from ray-matched data (day/night effects removed)
- The GMS navigation errors corrected
- GEO-specific clear-sky albedo thresholds added
- Surface emissivity used for land IR thresholds (set for DAO)
- Hourly calibration tables added (Meteosat)
- Visible and IR histogram information produced for QC
- Cold Cloud and Noon Data collected for calibration QC
- QC Web pages modified
  - Improved interface
  - Improved
- GGEO subsystem updated for consistency with Clouds subsystem

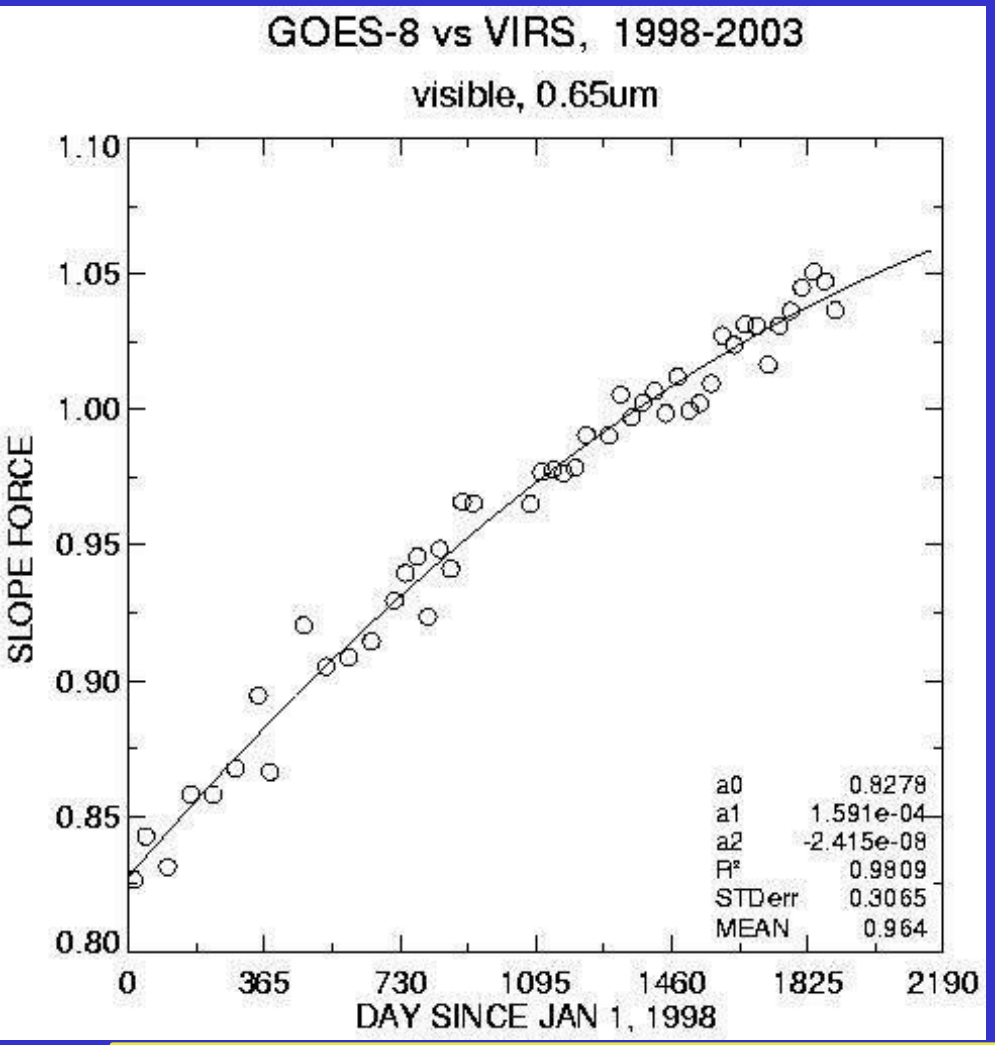
TISA Data Product Status
GGEO

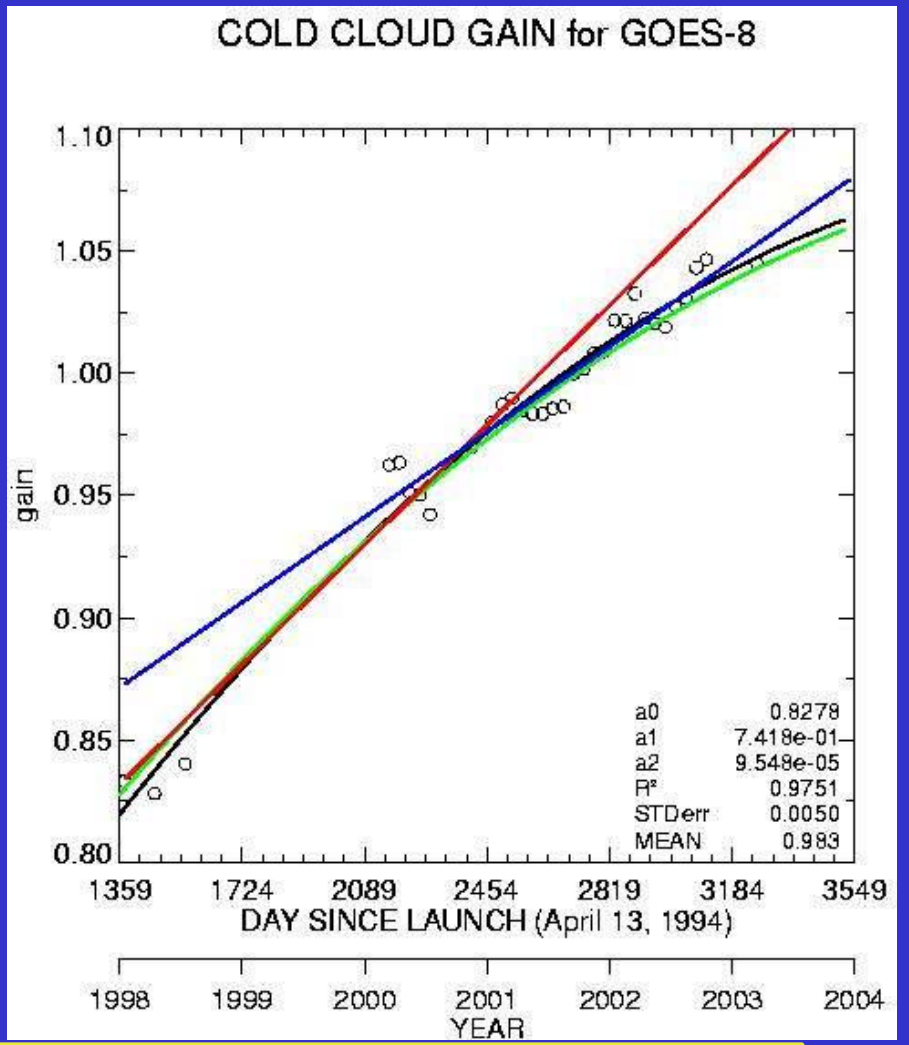
- Over 2 Years tested at DAAC
  - Tests stability for operational processing
  - Provides data for calibration time series
- 2001 completed and used in Beta 2 SRBAVG
  - Calibration automated
- Cloud amounts compared with 1998 results

GGEO Calibration Techniques

- Ray-matched MODIS vs GEO radiance data
  - Ties calibration to well-calibrated MODIS data
- Deep convective cloud albedo
  - Used to get trends (not absolute calibration)
- Noon matching of GEO data at central longitudes
- Doelling to present results in Co-I report

Consistency of Calibration Methods





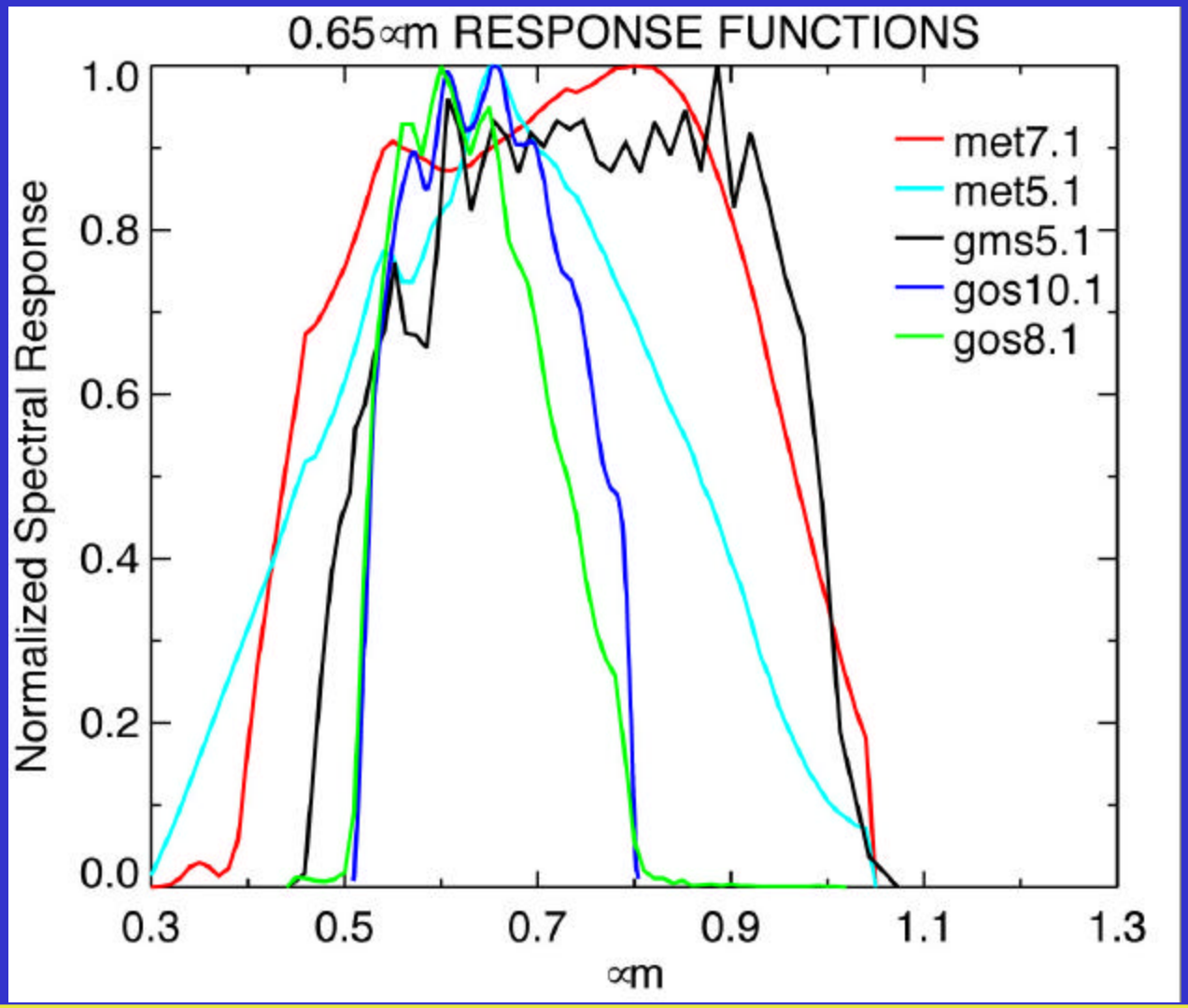
GEO Clear-sky Threshold Correction
Objective

- MODIS clear-sky albedos are used in GEO cloud retrievals
  - Results in overestimate of daytime cloudiness over land
- Spectral differences result in differences in
  - Surface reflectivity
  - Atmospheric absorption
  - Rayleigh scattering
- Need to derive correction factors as a function of
  - GEO satellite
  - Surface vegetation type
  - Season

Method

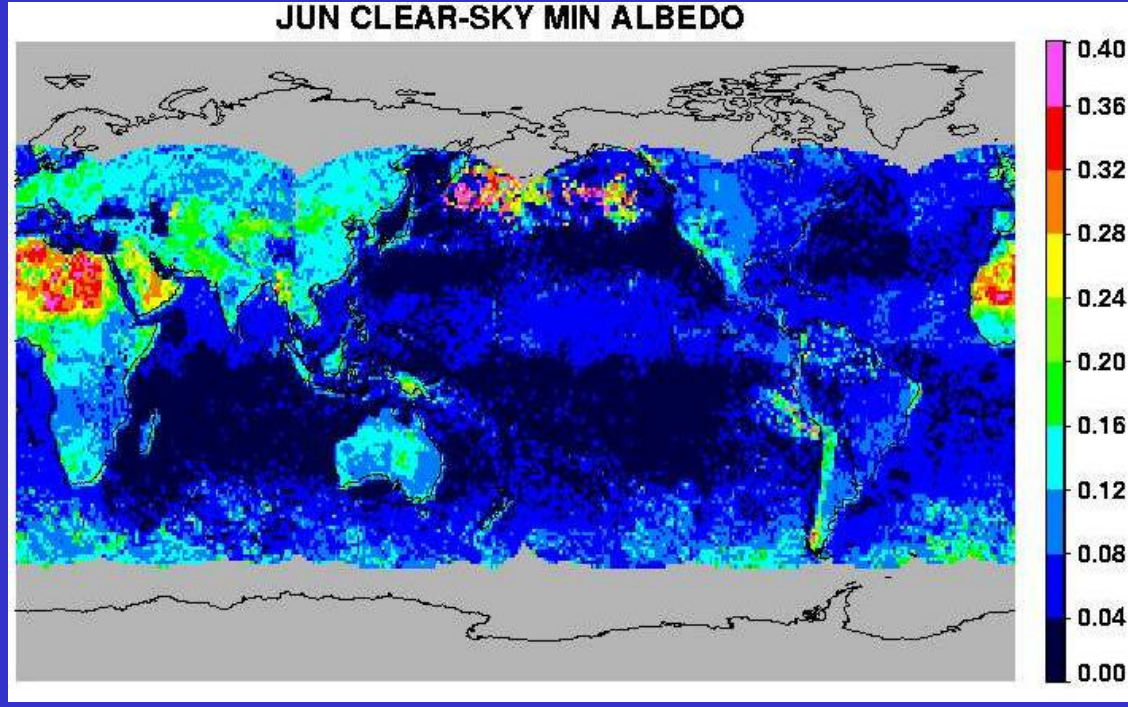
- Use MODIS monthly start-up maps
  - Average from 10-minute to 1° resolution
- Compare with GEO data from January and June 2001
- GEO albedos derived using
  - Minimum values
  - A variety of directional models
- Derive GEO/MODIS albedo ratios after eliminating
  - Snow regions
  - High GEO standard deviations
- Average for each scene type & GEO satellite

GEO spectral response functions

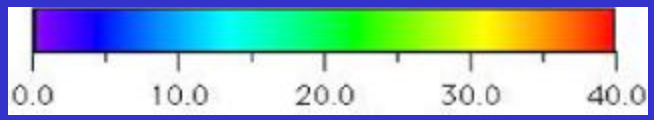


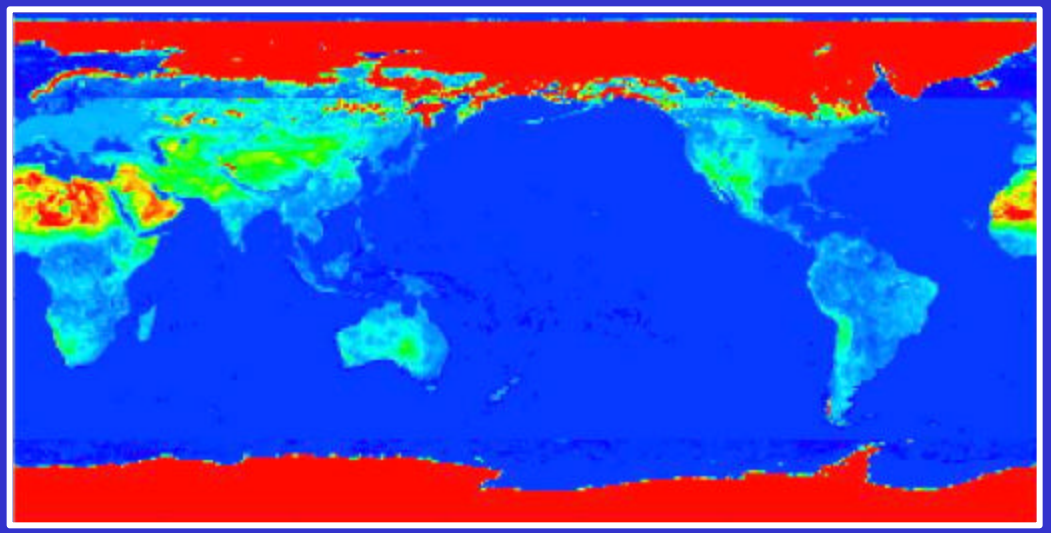
June 2001

GEO Clear-Sky Albedo



MODIS Clear-Sky Albedo





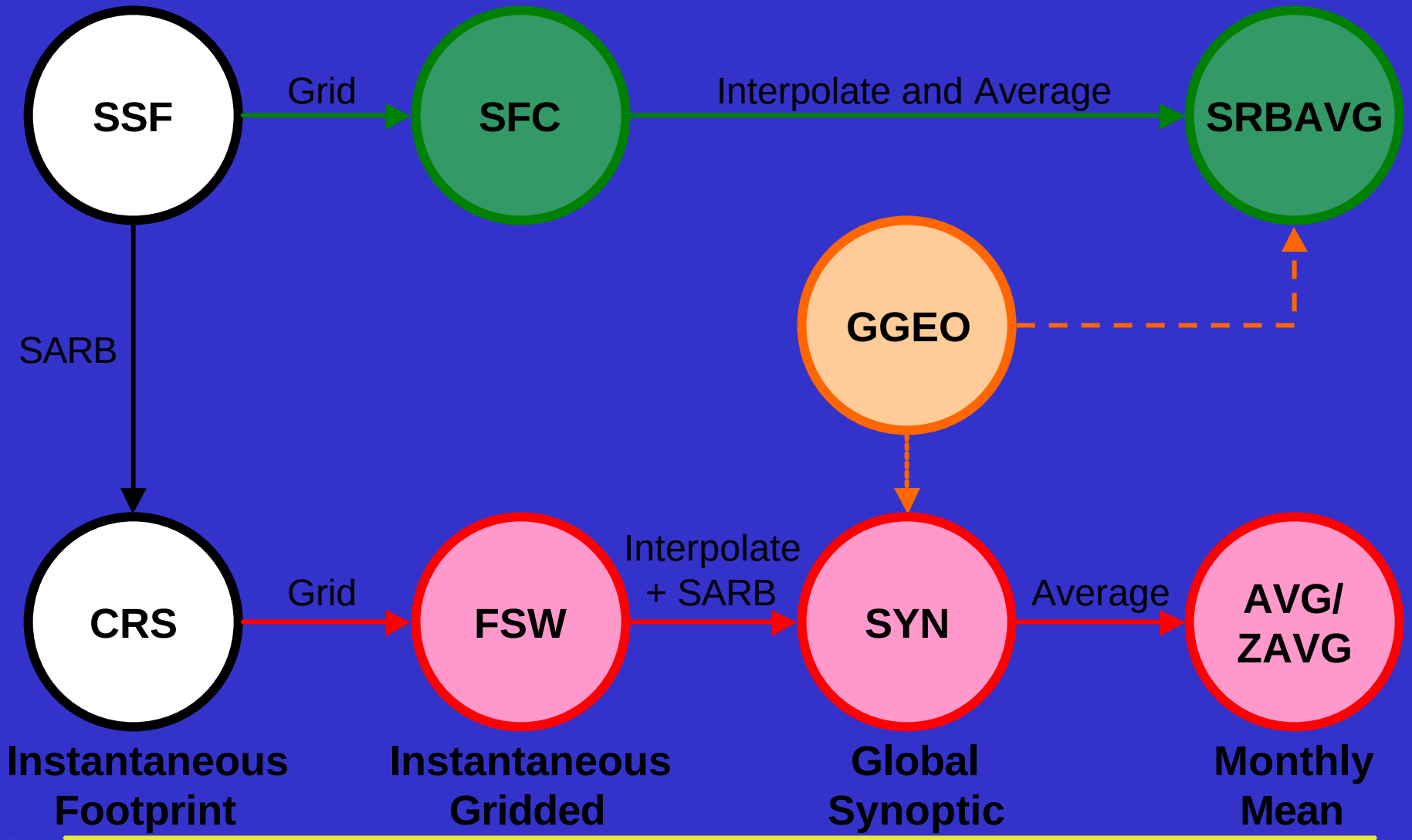
Results for January 2001

	METEOSAT-7 Ocean	METEOSAT-7 Land	METEOSAT-7 Desert
Correction:	0.85	1.15	1.25
VIRS cloud fraction	0.66	0.54	0.06
GEO cloud fraction (uncorrected)	0.66	0.74	0.18
GEO cloud fraction (corrected)	0.68	0.62	0.10

GGEO Status Summary

- Calibration finalized
- Clear-sky threshold to be finalized this week
- Delivery soon

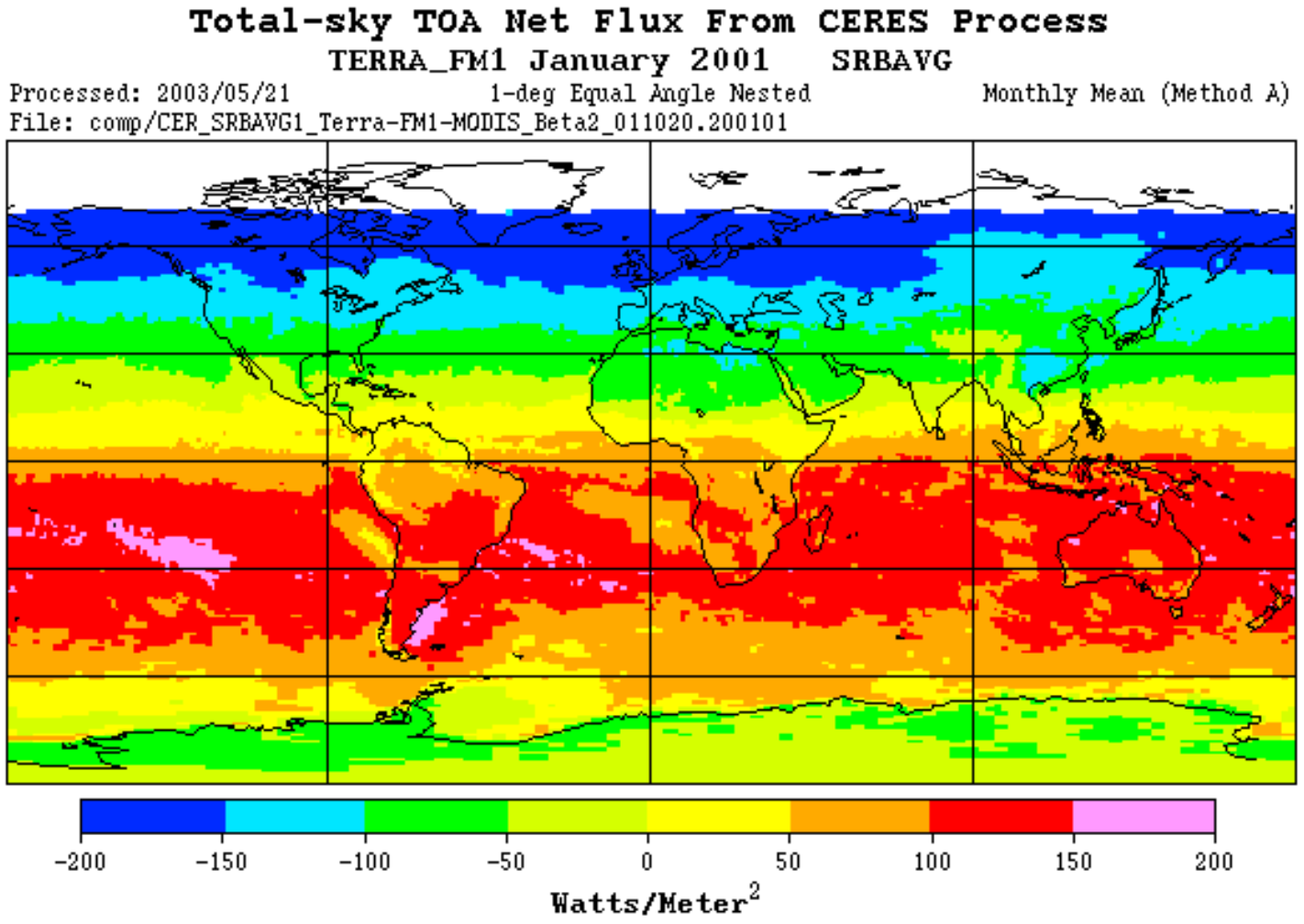
CERES Advanced TISA Processing



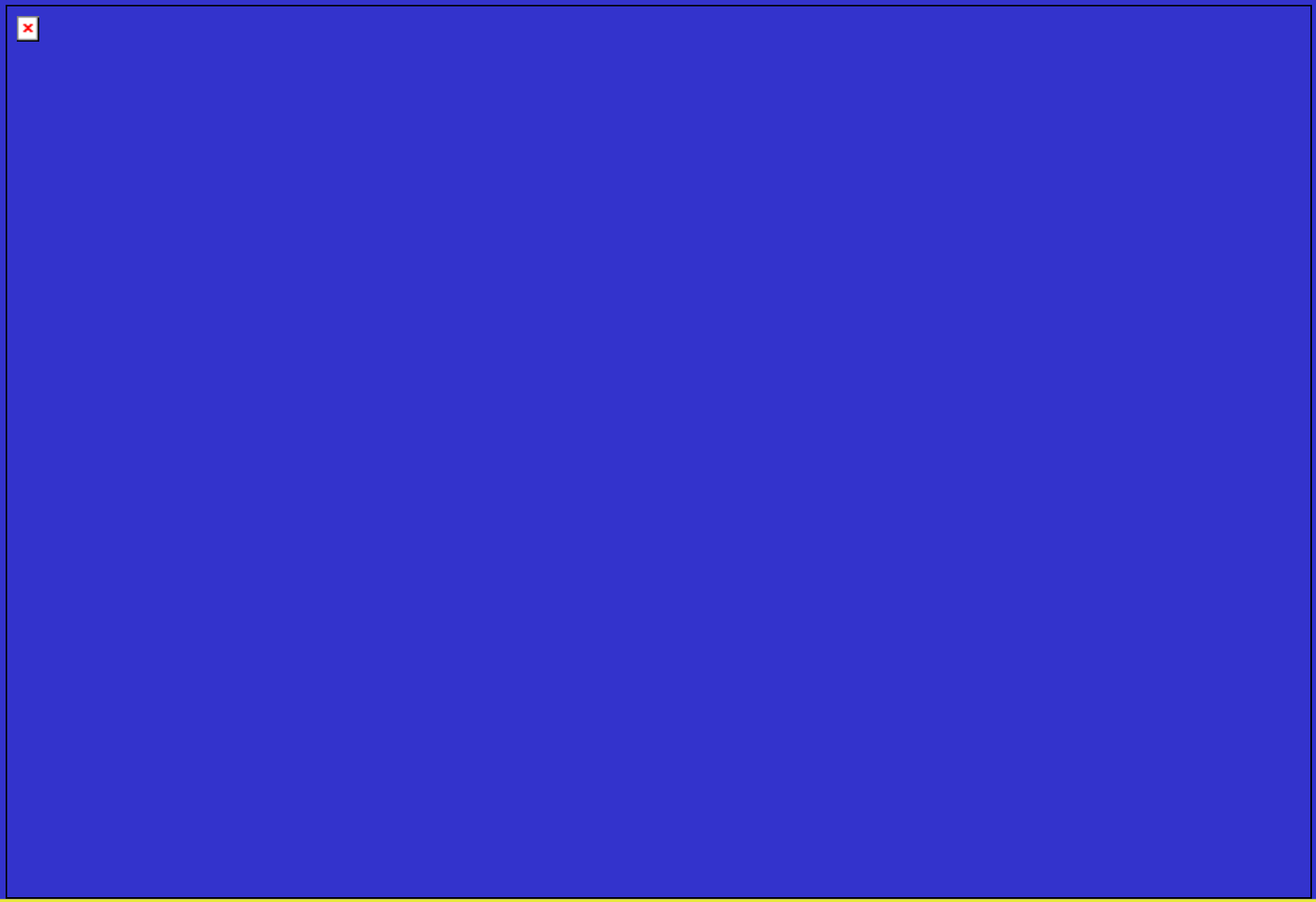
TISA Software Development Status
SFC / SRBAVG

- 1 year of Beta 2 in archive
  - GGEO cal not final
  - old NB-BB
  - Edition 1 fluxes & clouds
- TRMM directional models used for Terra
  - TRMM ADM types were written onto Terra SFC FSW products
- The HDF compression was added (Saves ~70%)
- Final development:
  - New NB-BB
  - Nighttime interpolation

TOA Net Flux from Terra FM-1 2001



ERBElike - SRBAVG Seasonal Net TOA Flux



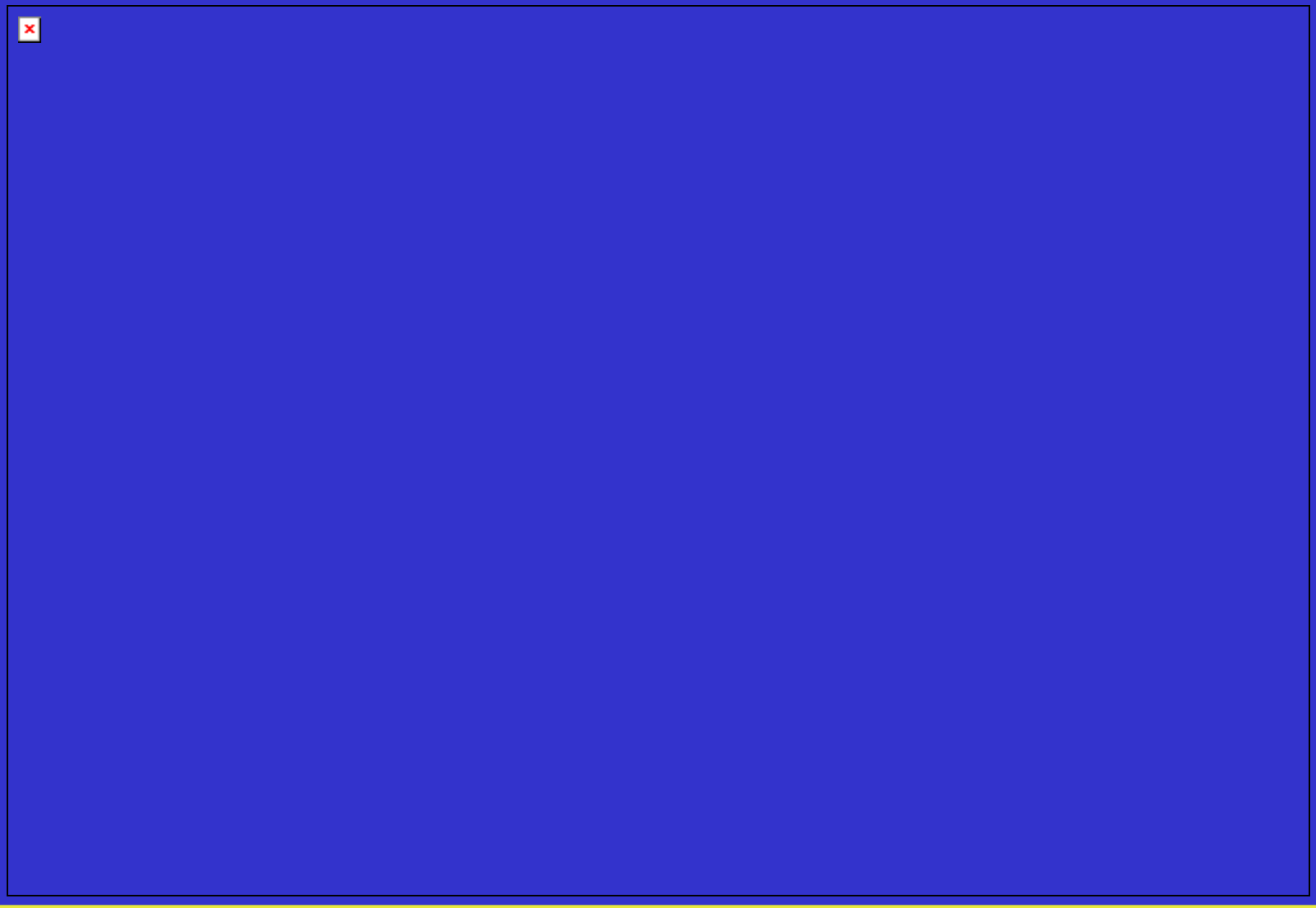
Global Annual (2001) Mean TOA All-sky Fluxes

	ERBElike	nonGEO	GEO
LW	238.7	238.2	237.5
SW	98.0	98.1	98.6
Net	4.6	6.5	5.0
Albedo	28.7%	28.7%	28.9%

Interannual Variation of Global Mean TOA All-sky Fluxes

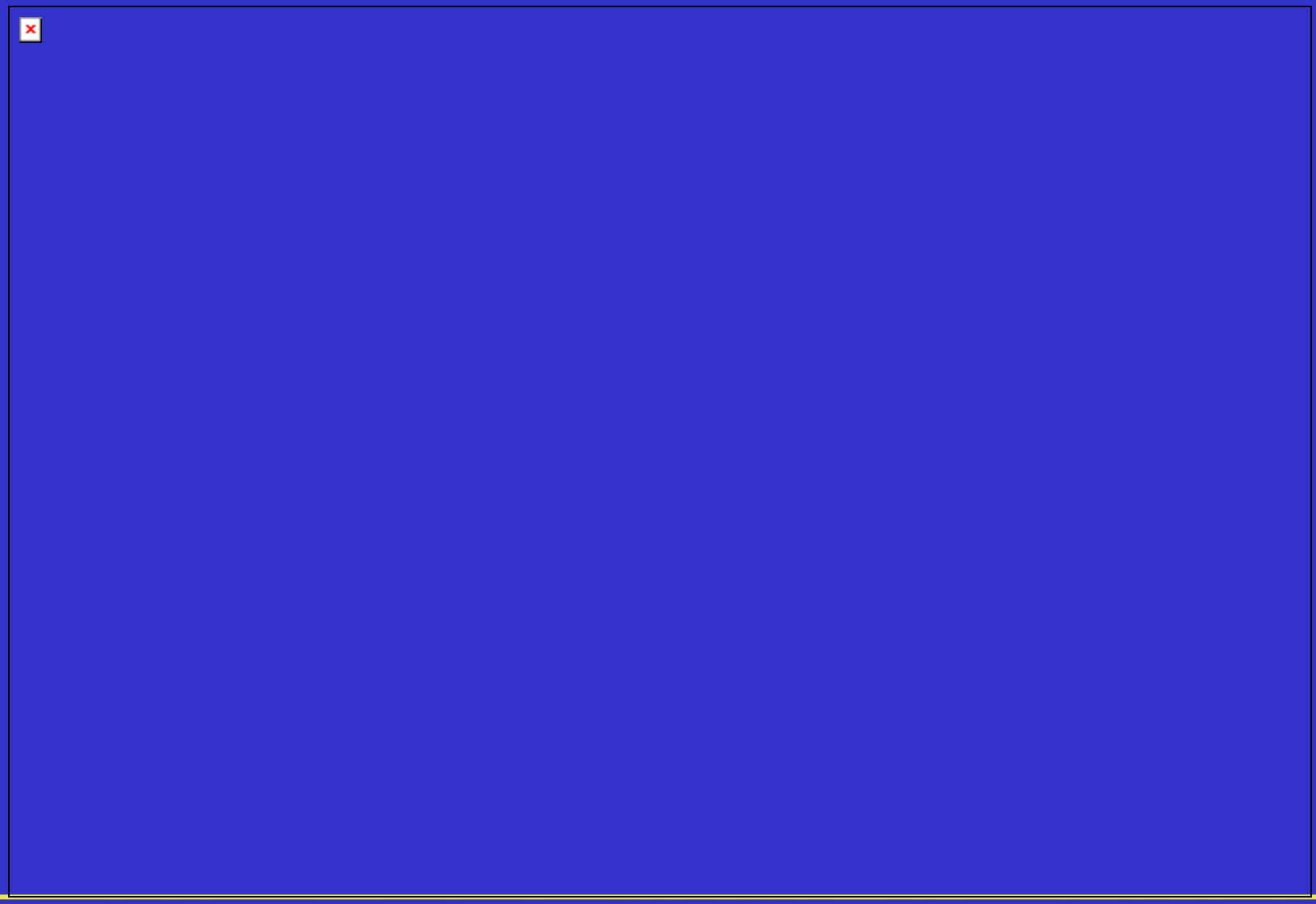
	3/00 - 2/01	3/01 - 2/02	3/02 - 2/03
LW	238.6	238.7	239.3
SW	98.7	98.0	97.1
Net	4.0	4.7	4.9
Albedo	28.9%	28.7%	28.4%

ERBElike - SRBAVG Annual Net TOA Flux

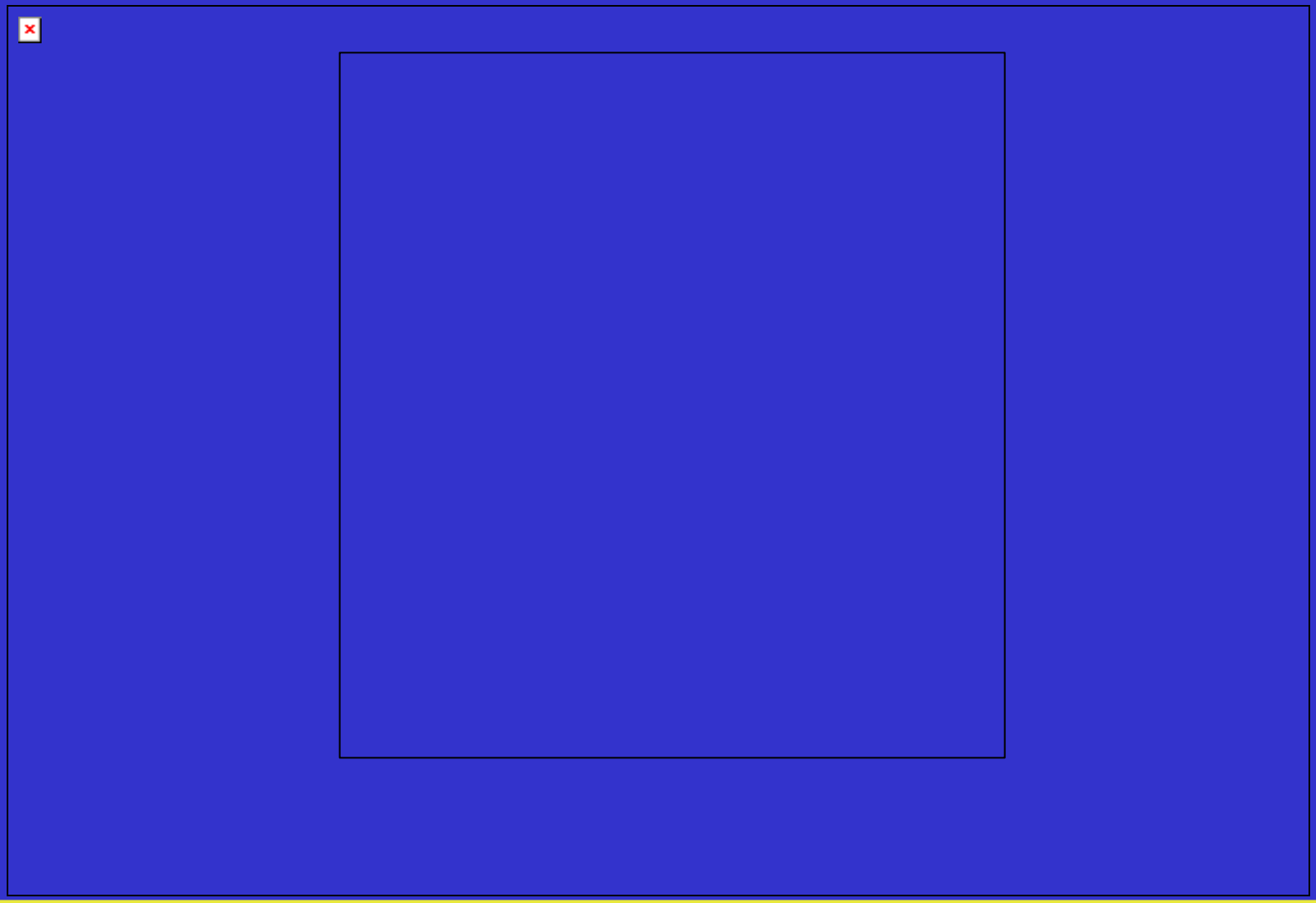


ERBElike - SRBAVG Annual SW TOA Flux

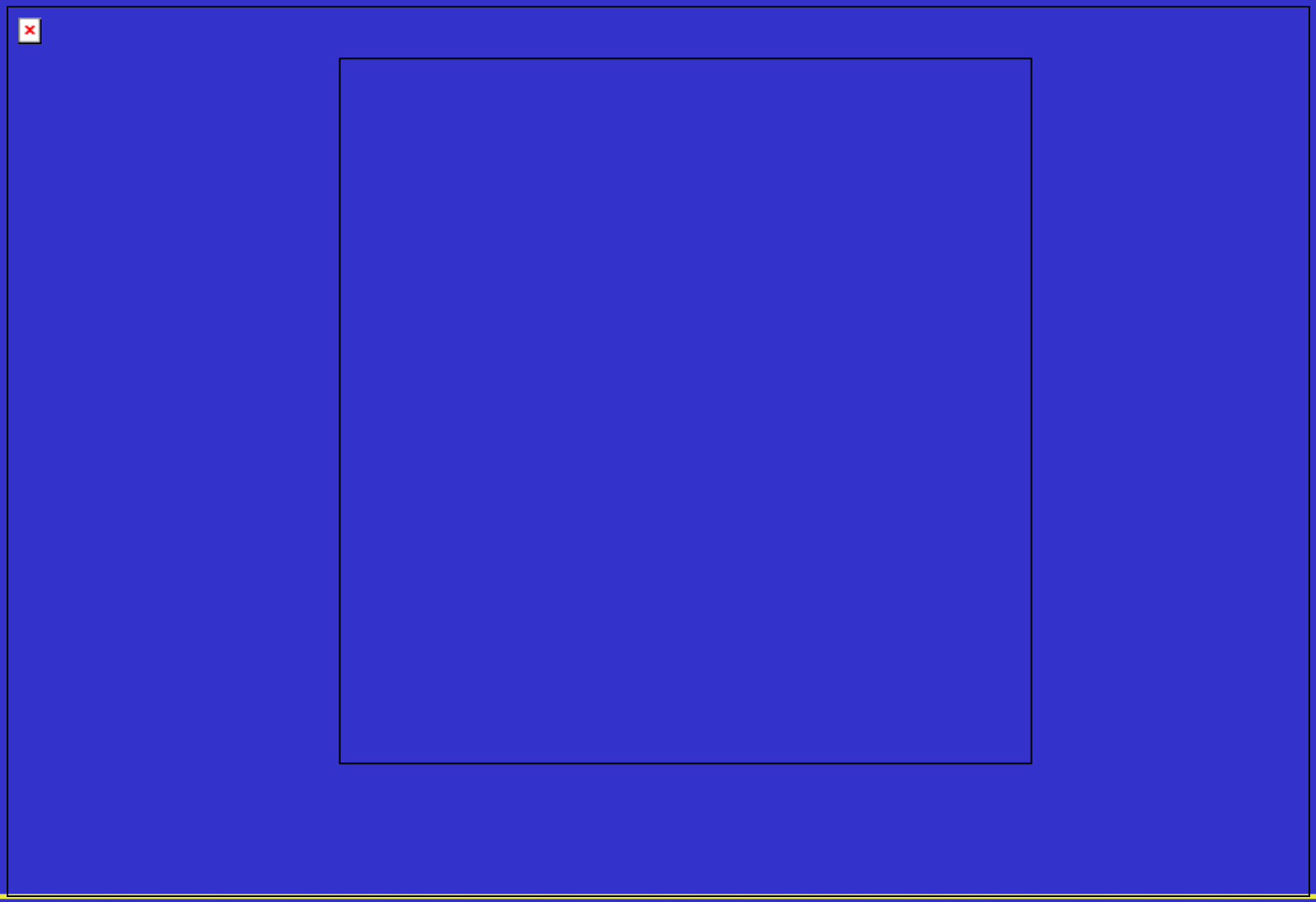
ERBElike - SRBAVG Annual LW TOA Flux



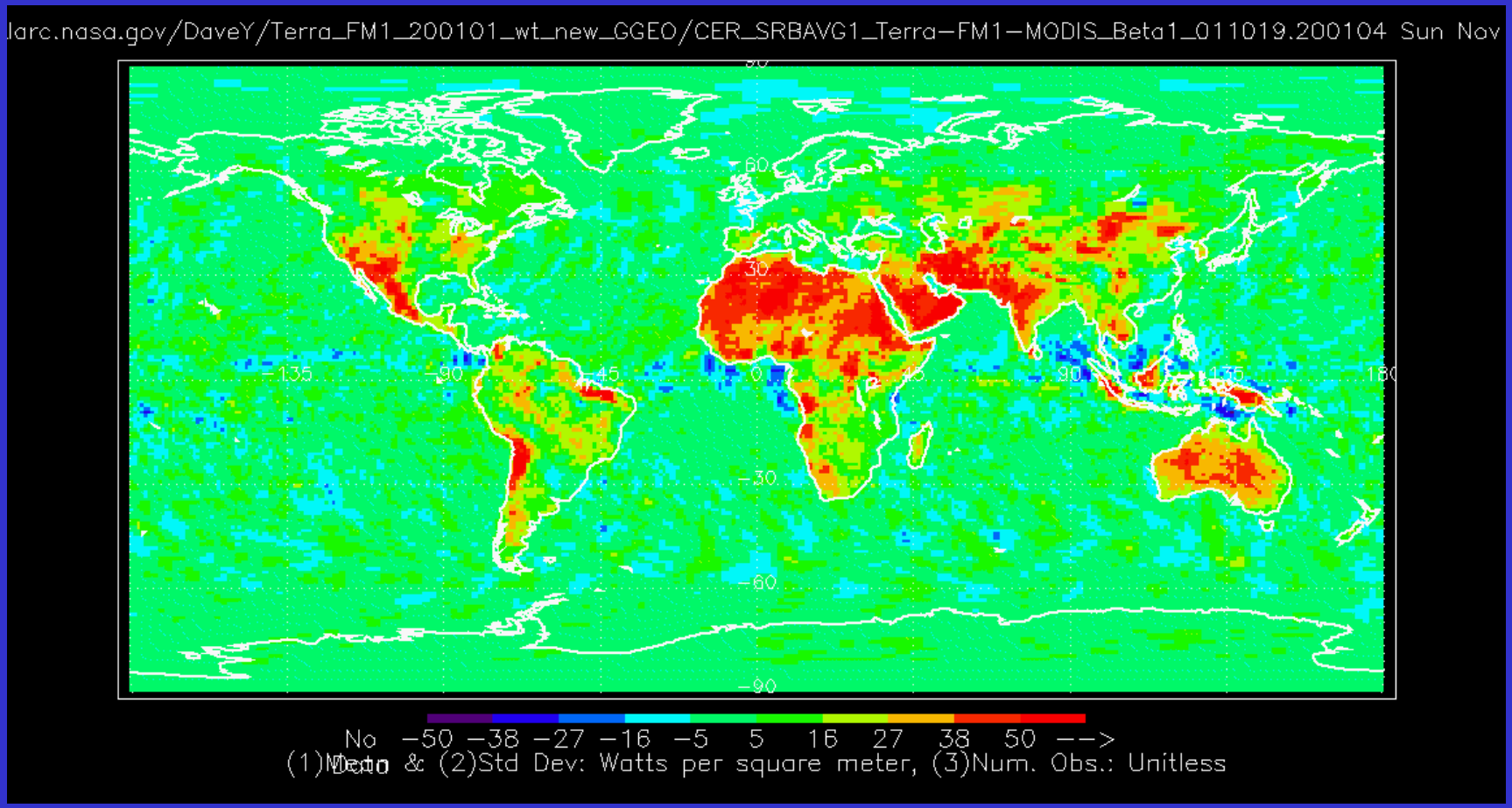
ERBElike - SRBAVG Annual Night LW TOA Flux



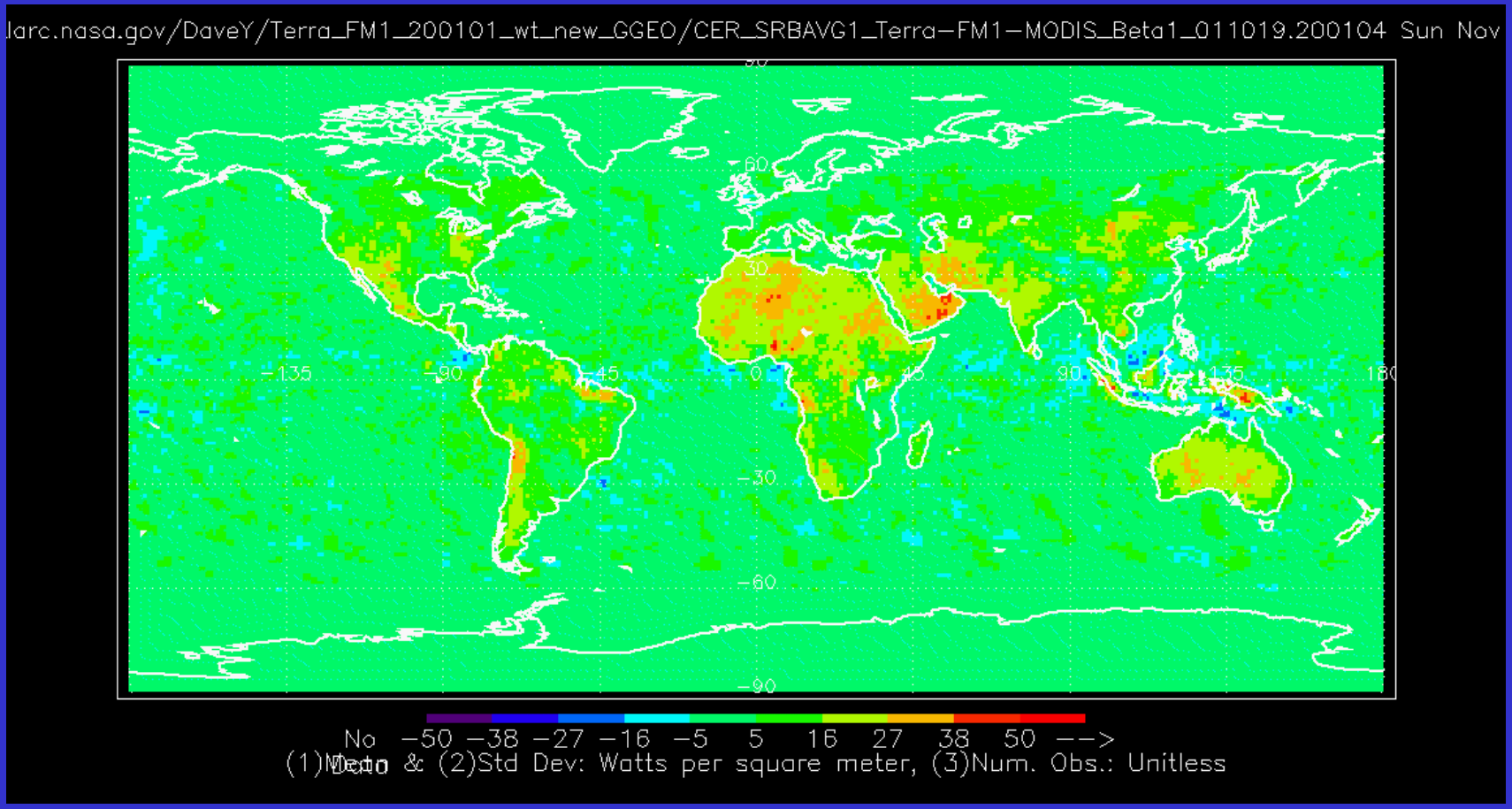
ERBElike - SRBAVG Annual Day LW TOA Flux



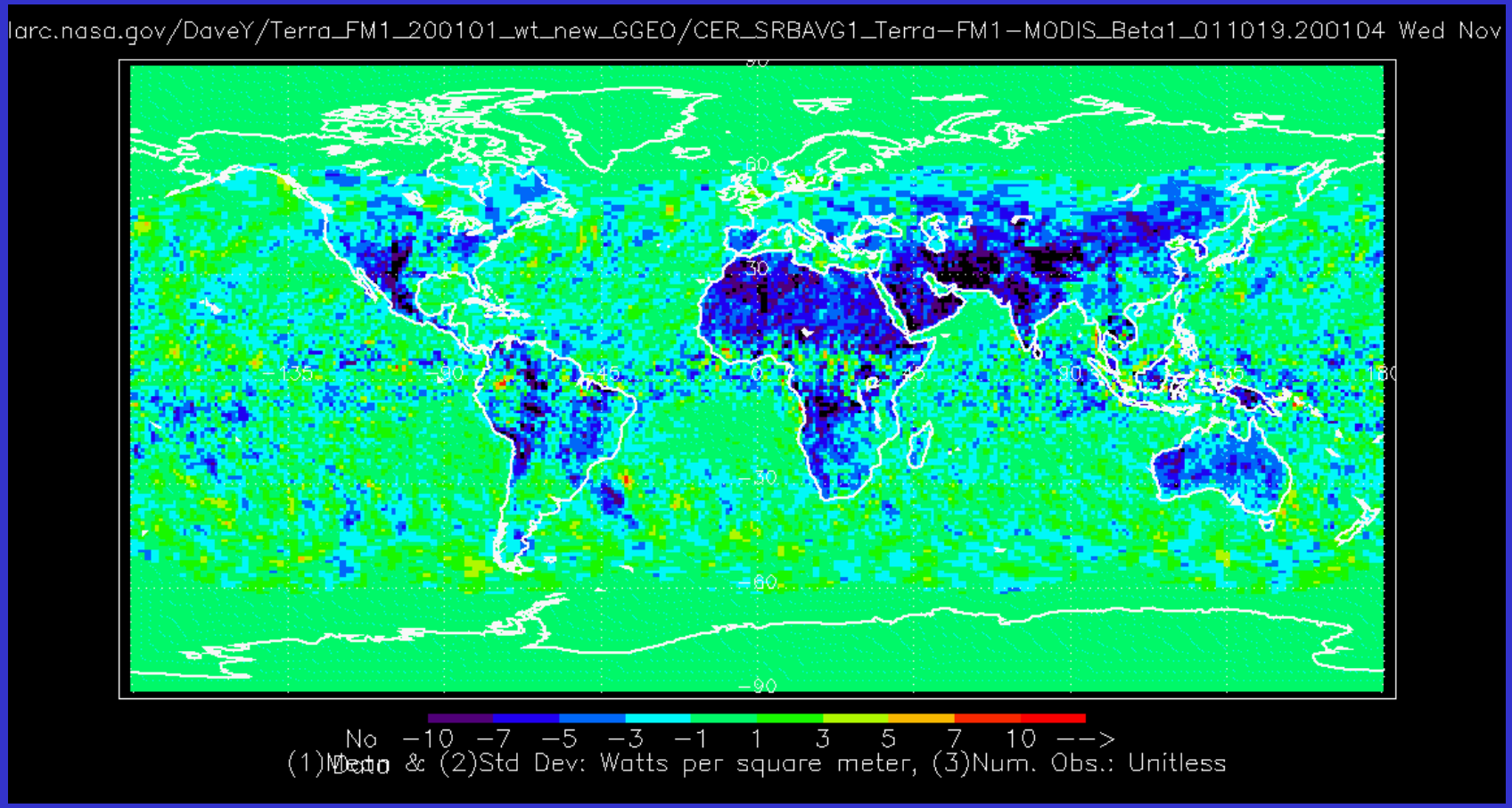
LW Diurnal Range (Noon - Midnight)
GEO April 2001



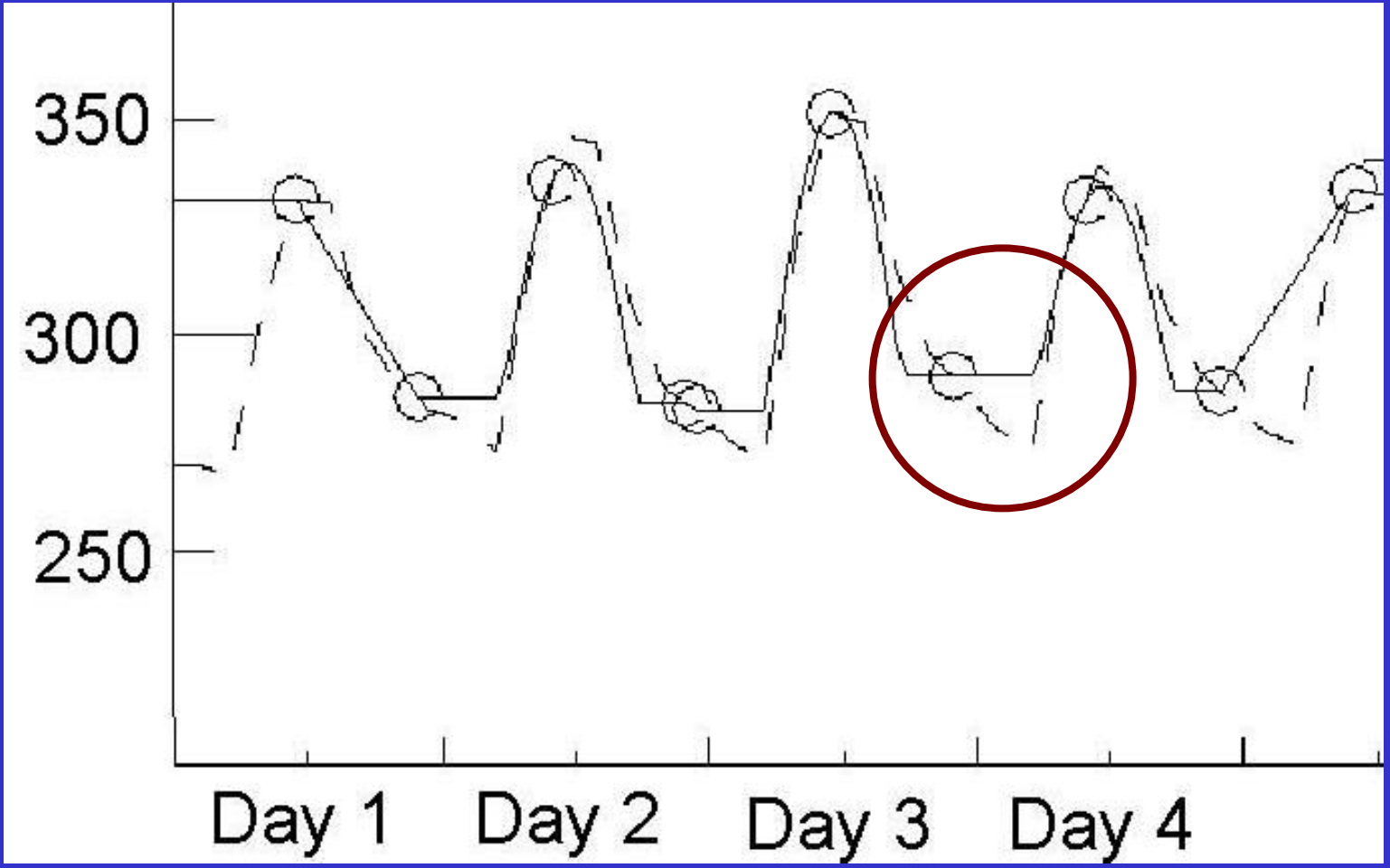
Monthly Mean GEO-nonGEO Total-sky LW Flux Diurnal Range April 2001



GEO - nonGEO TOA LW Flux Difference
Monthly Mean April 2001



Total-sky LW Flux (Sahara April 2001)



Global TOA LW Flux Comparison

Beta 2 SRBAVG January-December 2001

Global TOA SW Flux Comparison

Beta 2 SRBAVG January-December 2001

Global TOA Net Flux Comparison

Beta 2 SRBAVG January-December 2001

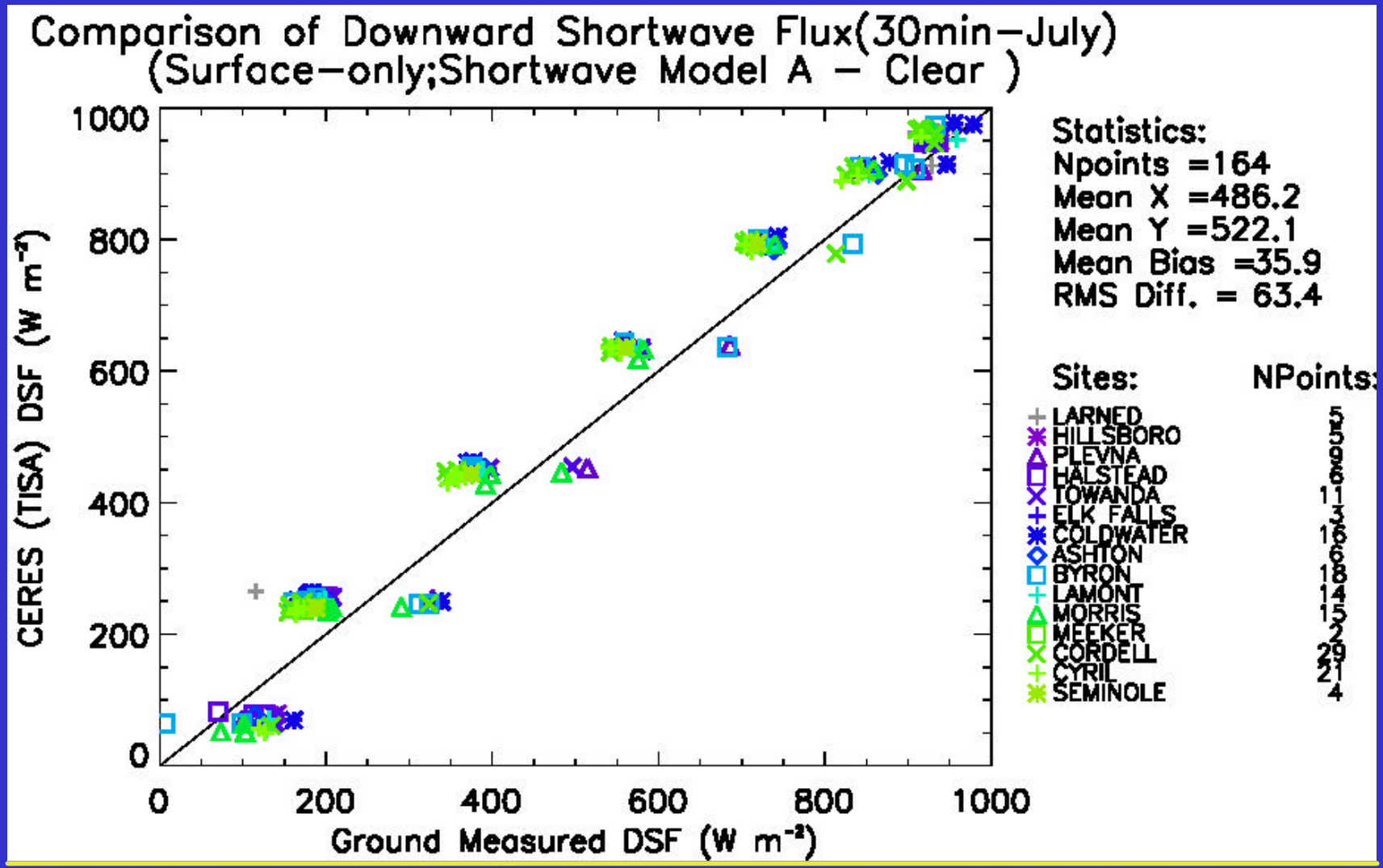
Summary of First Look at Annual Mean

- Global net 5 W/m^2 imbalance occurs in both ERBElike and SRBAVG products
- Error Budget
  - Ocean Heat Storage 0.5 - 1.0 W/m^2
  - SW ADM errors 0.5 W/m^2
  - LW ADM errors 0.1 W/m^2
  - SW TISA error 0.6 W/m^2
  - LW TISA error 0.1 W/m^2
  - Solar Constant error 0.9 W/m^2
  - CERES cal error 0.5 W/m^2
- If all in same direction, possible total of 5.4 W/m^2

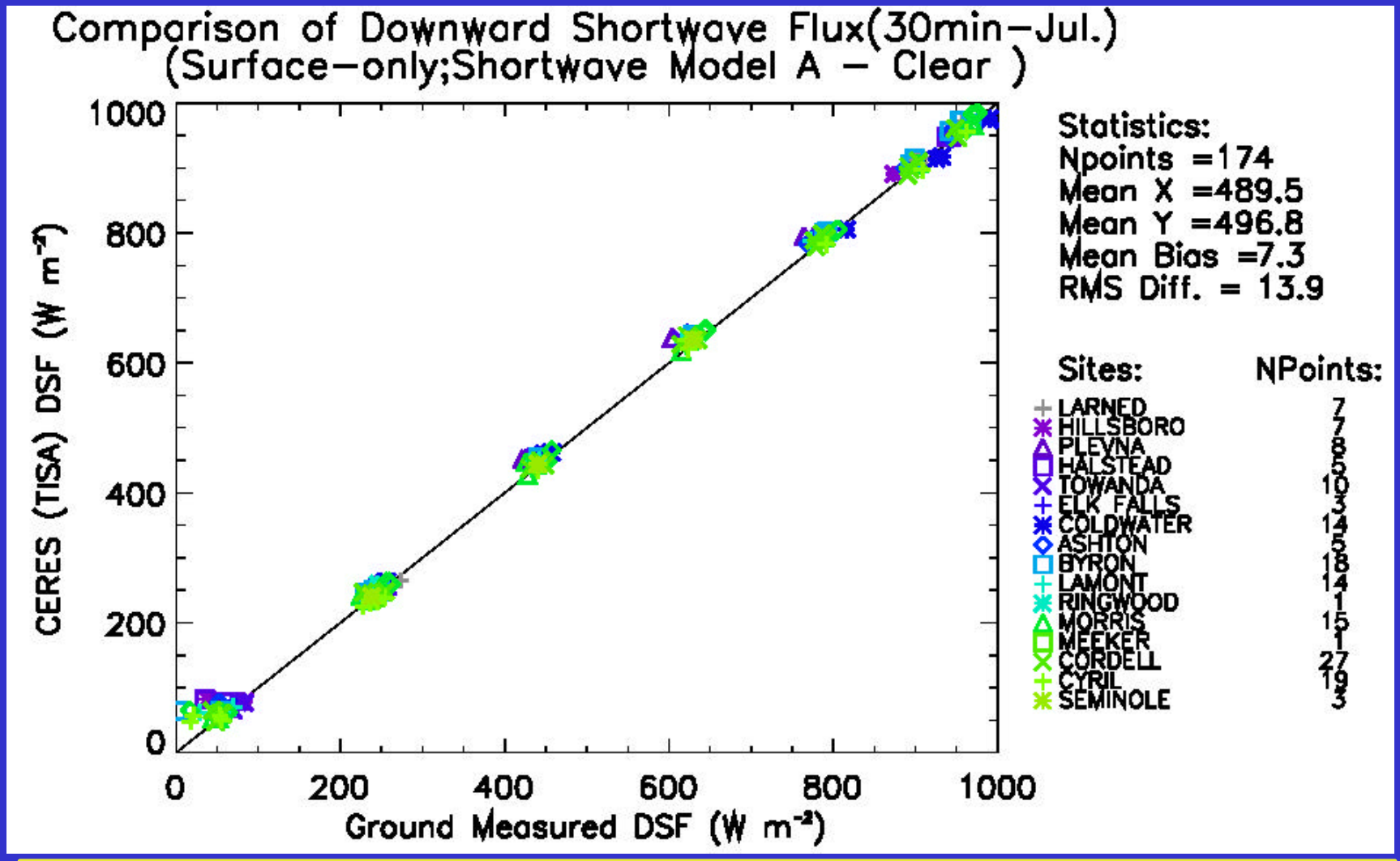
Validation

- Solved time matching problem for surface comparisons
  - Improves clear-sky surface SW rms
- Initial Terra surface comparison with BSRN
  - Calibration in Beta SRBAVG causes overprediction of cloudiness.
  - Top priority after final calibration
- New cloud property validation set

SRBAVG DCSW vs. ARM SGP (uncorrected)



SRBAVG DCSW vs. ARM SGP (corrected)

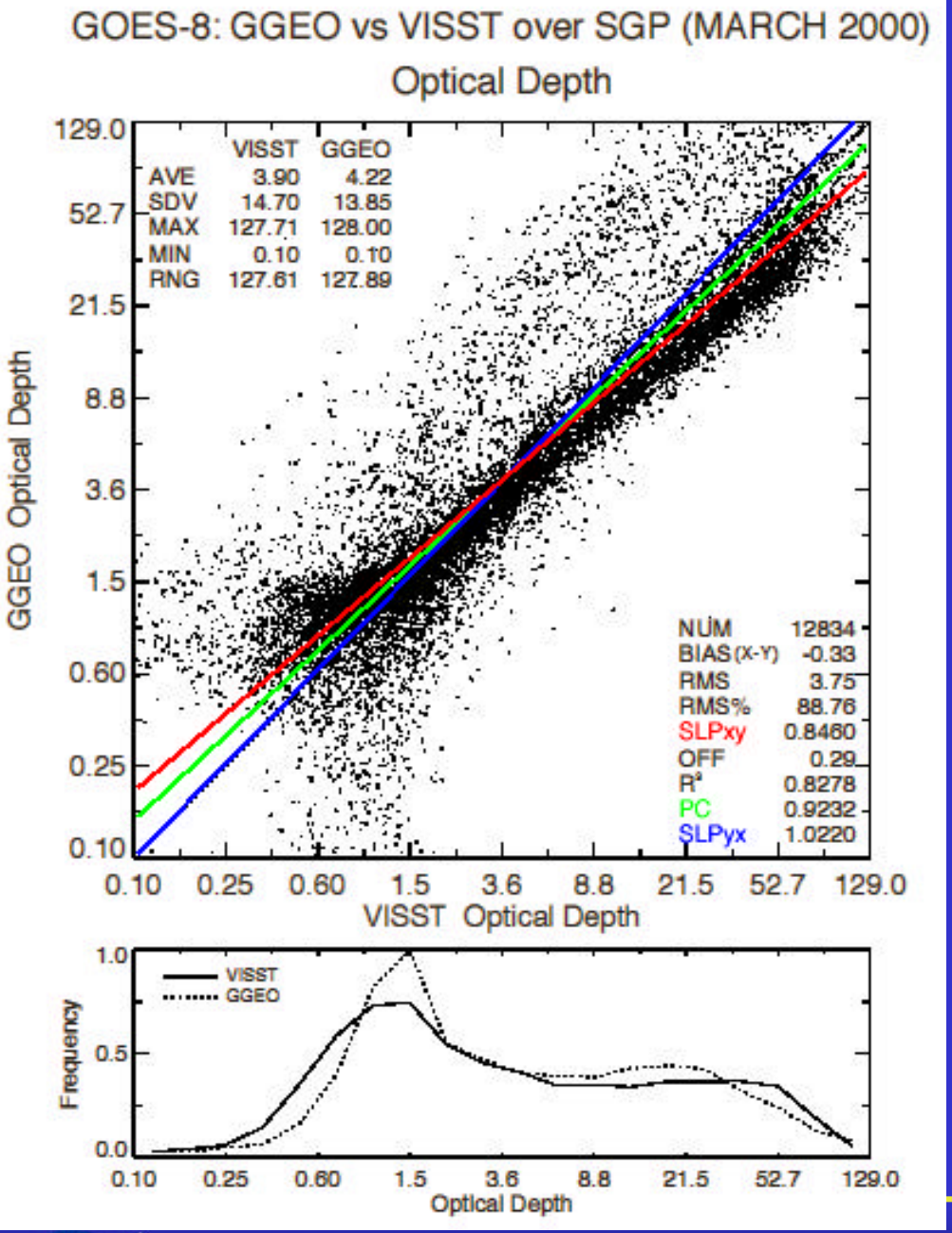


CONUS Cloud Property Validation Data Set

- Data description
  - Derived from GOES data using CERES cloud algorithm
  - 42 - 32 N; 105 - 91 W (Includes ARM SGP)
  - Half-hourly resolution

- Half-hour resolution allows testing of interpolation
- Testing possible algorithm changes
  - Optical depth histogram equlization
  - Normalize night / day retrievals
  - Use daytime cloud emissivity at night

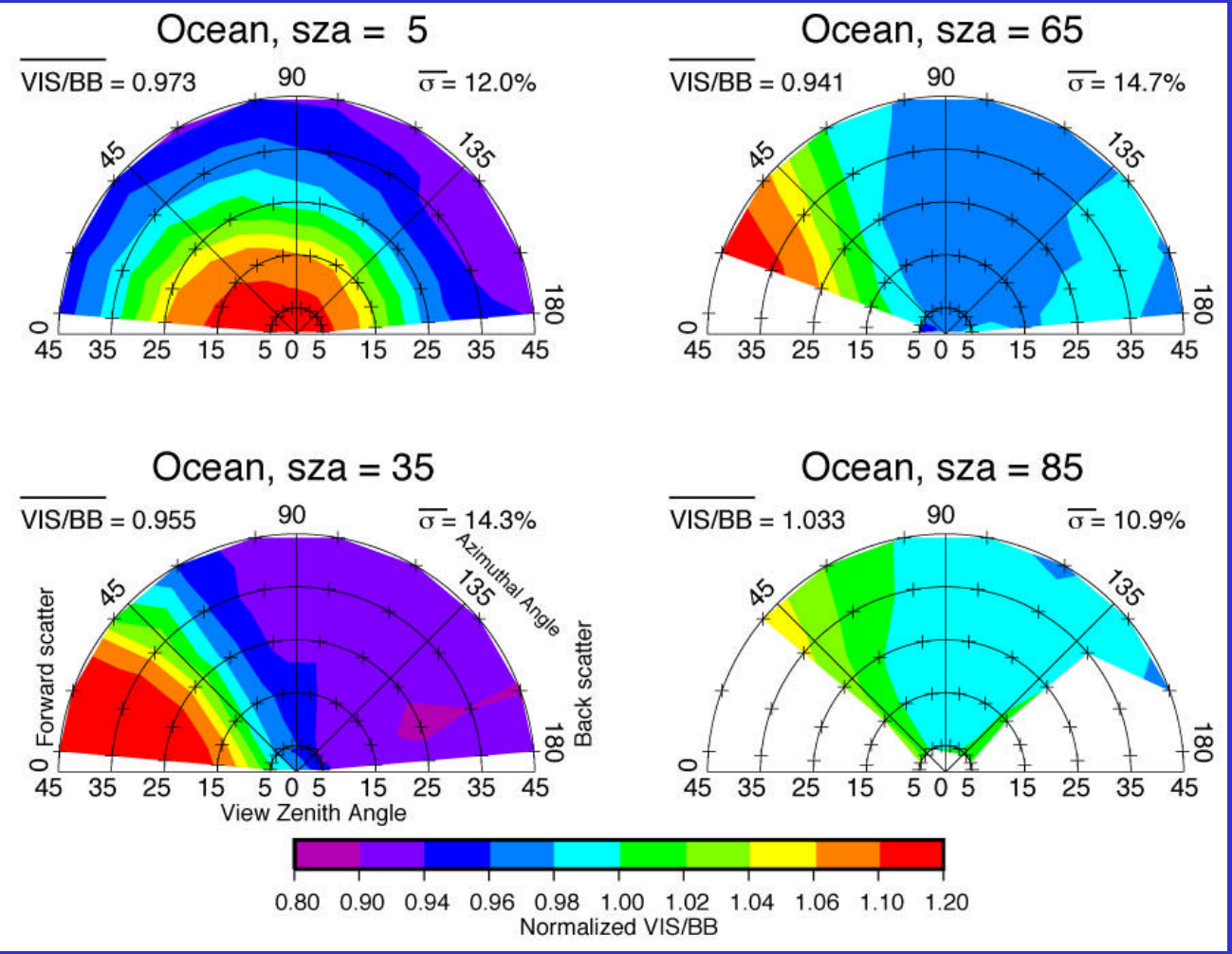
GEO vs VISST Optical Depth



Future

- Goal: 3 years of validated SRBAVG by March STM
- Validation
  - SW integration test for snow
  - GEO calibration sensitivity for Terra
  - Terra surface flux comparison (BSRN and SRB)
  - Cloud interpolation over CONUS
  - March 2000 TRMM/Terra comparison
- GEO
  - Move to McIdas data
  - Plan for 1-hourly GEO for reprocessing
  - Extend calibration studies
  - Narrowband - Broadband improvement (Doelling)

Normalized VIS/BB Ratios for clear-sky ocean (various SZA)



Ratios are scene type and angle-specific

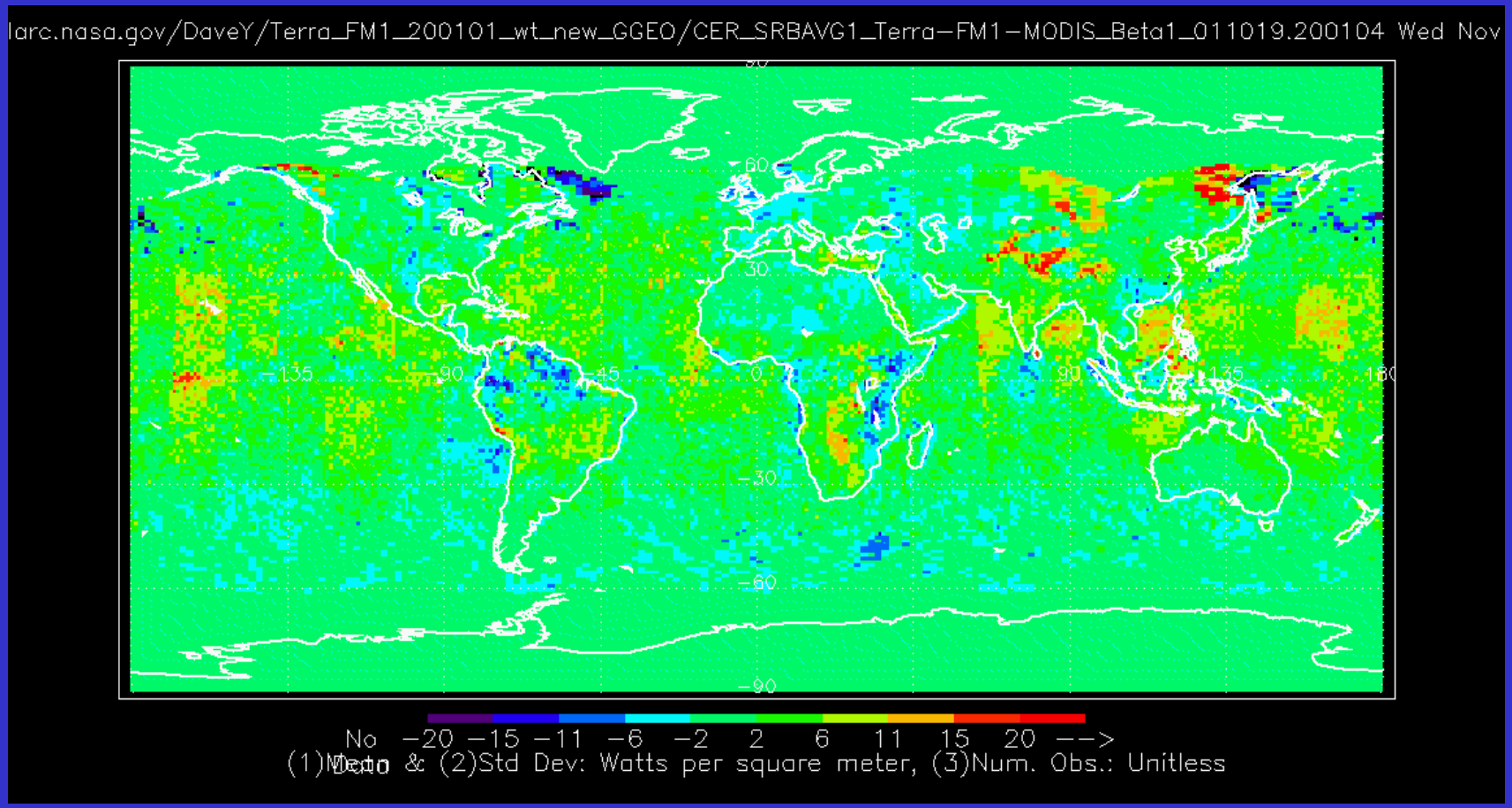
Details to follow from Doelling

Extras

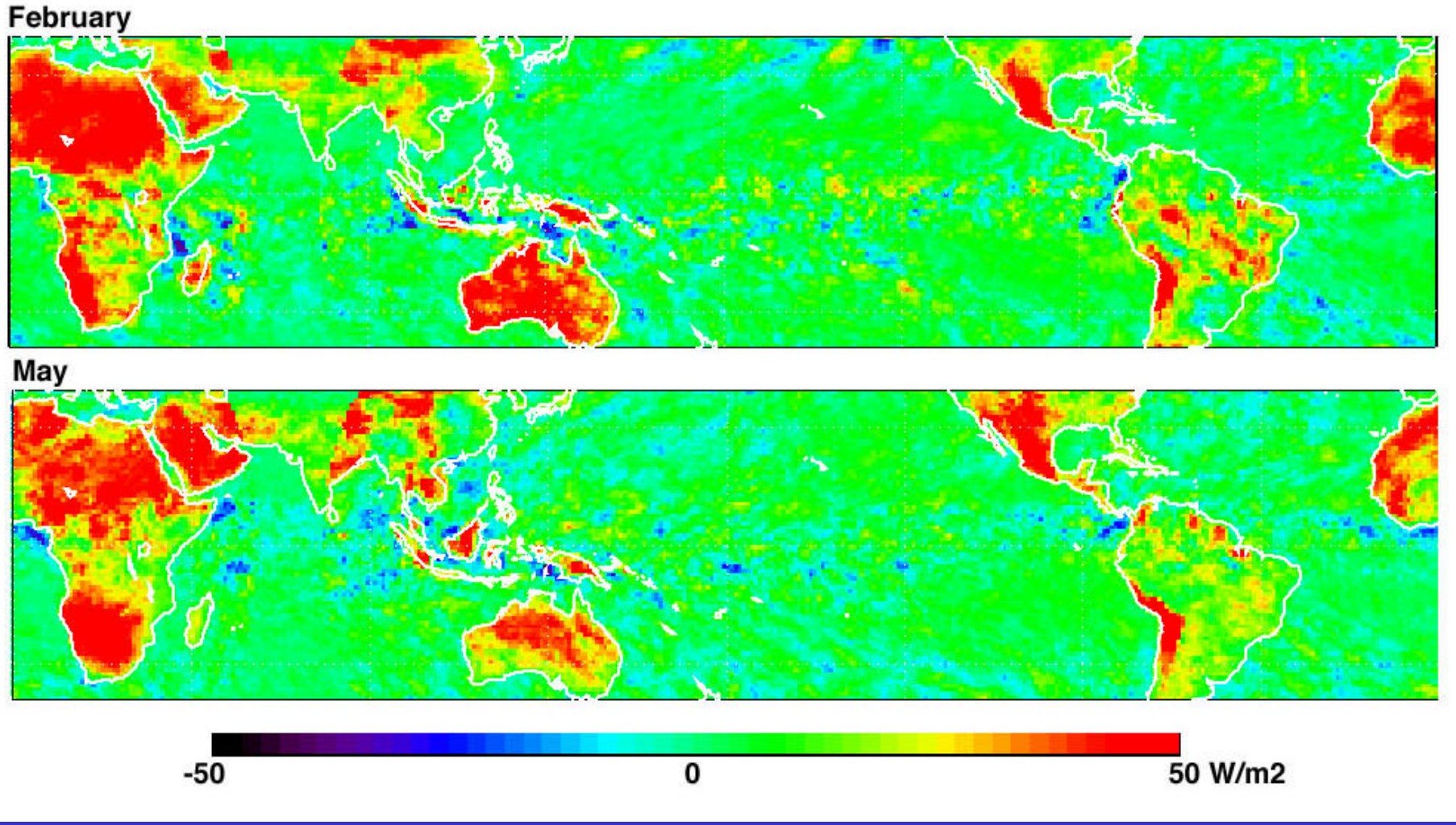
Annual (2001) Mean TOA Fluxes

	ERBElike	nonGEO	GEO
LW	238.7	238.2	237.5
SW	98.0	98.1	98.6
Net	4.6	6.5	5.0
Albedo	28.7%	28.7%	28.9%
Clear LW	266.6	265.9	263.9
Clear SW	48.6	51.8	51.8
Clear Net	29.5	34.2	35.8
Clr Albedo	14.25%	15.2%	15.2%

GEO - nonGEO TOA SW Flux Difference
Monthly Mean April 2001



TRMM Monthly Mean GEO-nonGEO Total-sky LW Flux Diurnal Range



TOA LW Flux 2:30 - 9:30
GEO April 2001